

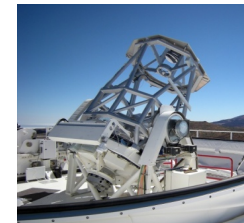
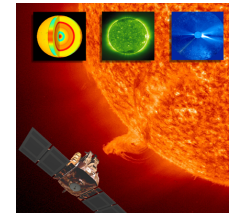
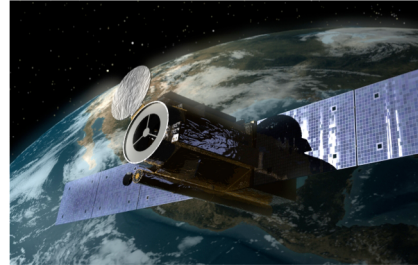
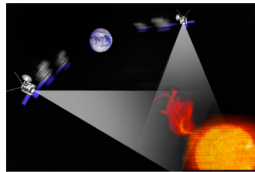
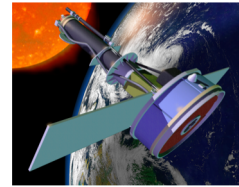
Novel science from the joint use of DKIST, SOLO, PSP

V. Martinez Pillet (NSO)



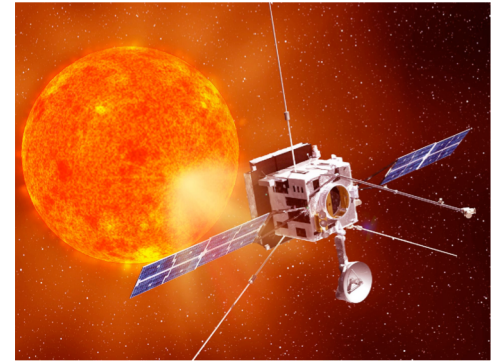
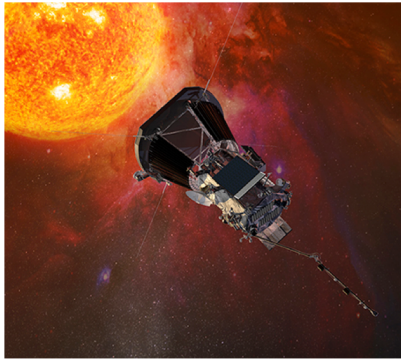
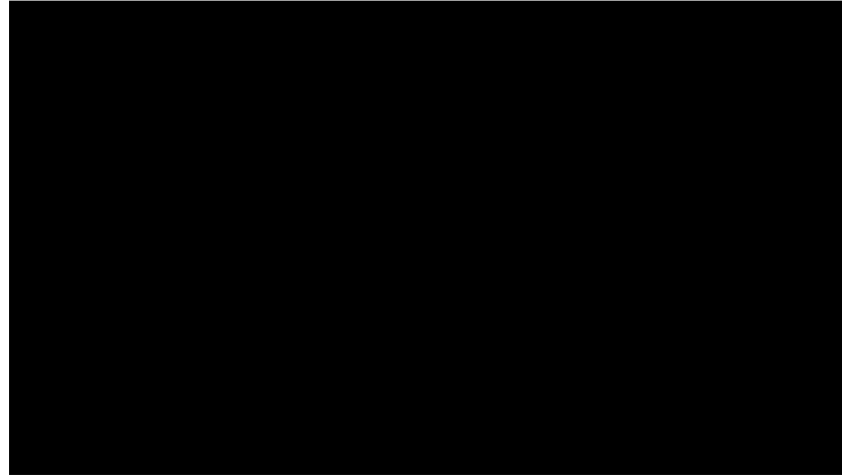
DKIST in the broader context

5 space observatories at 1 AU
4 telescopes in the 1m range



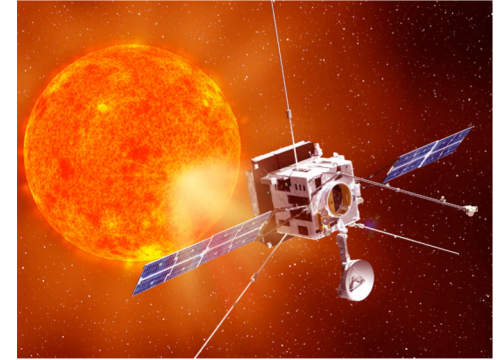
Space and Ground based Observatories Coordination

DKIST in the broader context



What can we do together?

DKIST in the broader context



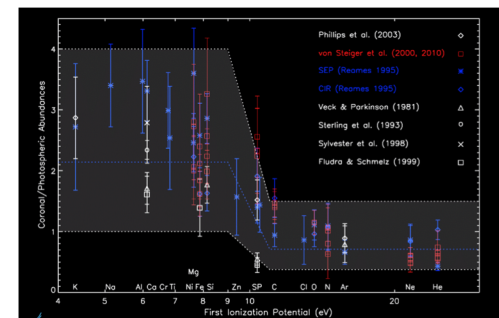
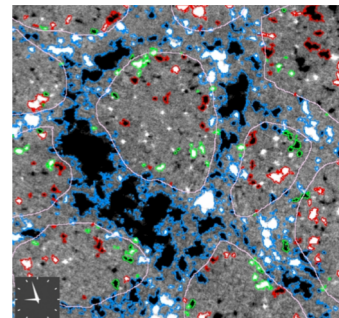
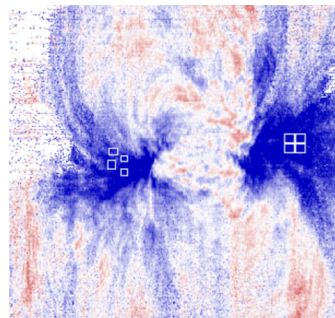
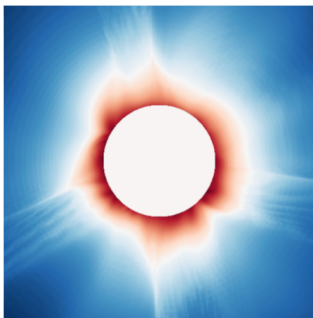
Summer 2018
2018-2025
4 perihelion/year
9.8 R_{\odot}
in-situ (HI)
Perihelion windows

First half 2020
2 Hale cycles
Coronagraph
Maui, Hawai'i
Spectropolarimetry
Service Mode

2020
3 years cruise phase
30° out of ecliptic
60 R_{\odot}
in-situ+remote sensing
3 - 10 days windows

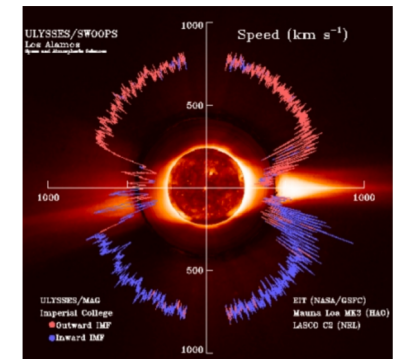
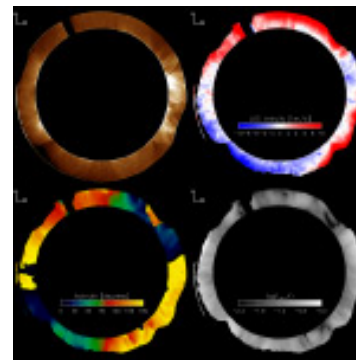
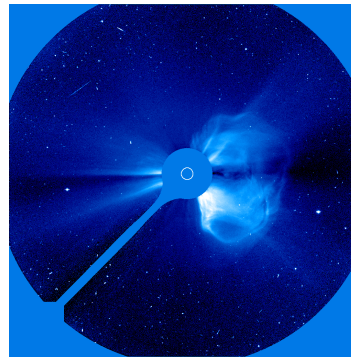
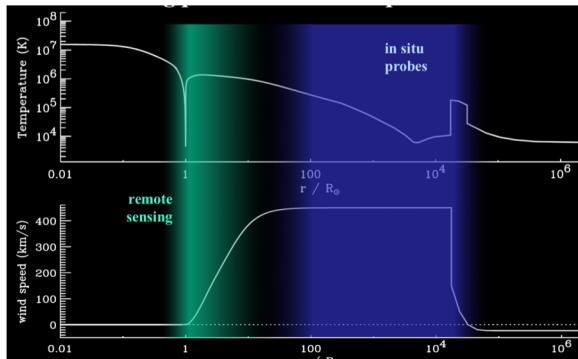
JIRA CSP: 12 SUC mention PSP+SO

1. *Coronal helium abundance from joint DKIST and Solar Orbiter observations. V. Andretta UC-60 → SO conjunction (opposition)+PSP*
2. *DKIST and Solar Orbiter observations for understanding the creation of upflowing plasma on the Sun. L. Harra UC-61 → SO in quadrature with DKIST on disk.*
3. *Short-term evolution of internetwork magnetic fields. L. Bellot Rubio UC-63 → Perihelion SO all orientations*
4. *FIP fractionation as tracer of solar wind source regions from joint DKIST and Solar Orbiter observations. S. Parenti UC-64 → SO conjunctions & quadratures*



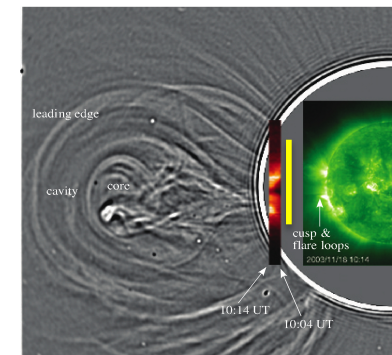
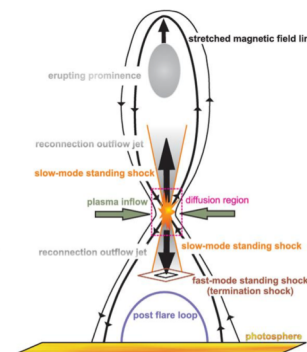
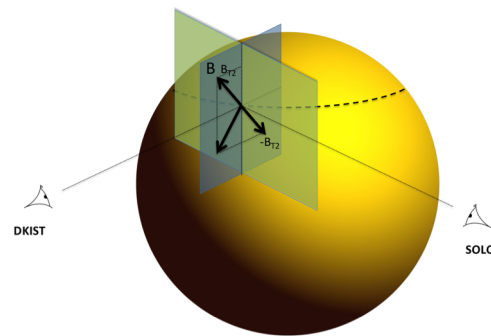
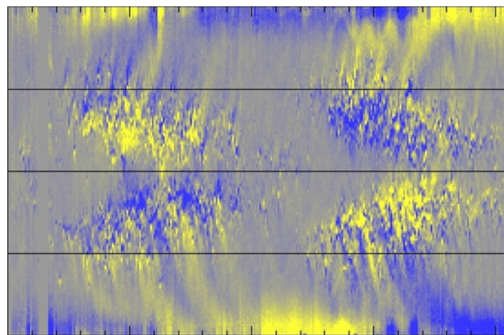
JIRA CSP: 12 SUC mention PSP+SO

5. *Properties of the solar wind source regions.* D Spadaro UC-88 → PSP (TBC)+SO in quadrature
6. *Tracking the evolution of Corona Mass Ejections plasma.* D Spadaro UC-89 → PSP (TBC)+SO in quadrature
7. *Synoptic Coronal Observations in support of PSP and Solar Orbiter.* V Martinez Pillet UC-90 → PSP+SO All windows
8. *Temperature, density and composition of the solar corona and the solar wind from joint DKIST and Solar Orbiter observations.* A. Fludra UC-115 → Perihelion SO (polar pointing) conjunction



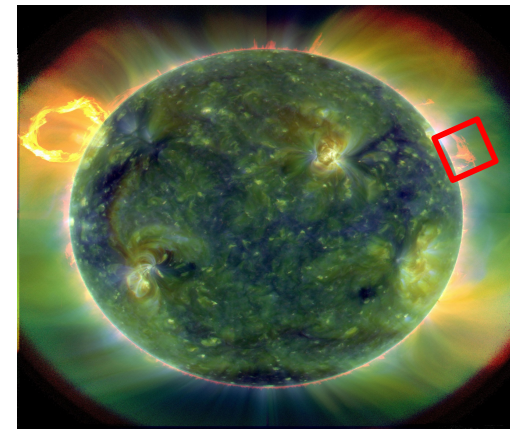
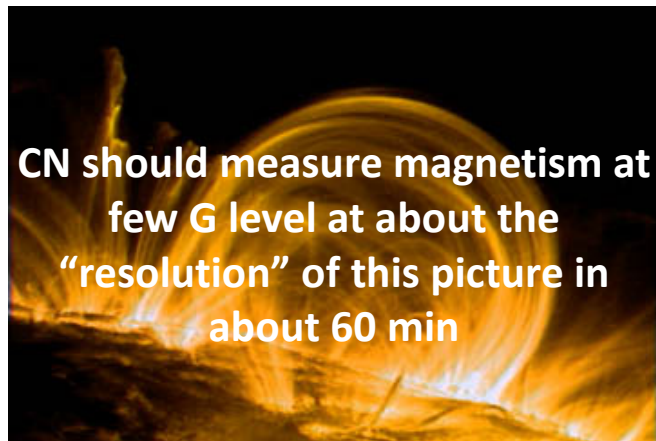
JIRA CSP: 12 SUC mention PSP+SO

9. *Polar magnetic fields from two vantage points: joint observations with Solar Orbiter.* A. Lagg UC-151 → High Latitude SO
10. *Helicity mapping for dynamo studies.* A. Lagg UC-152 → High Latitude SO
11. *Stereoscopic magnetic field measurements: joint observations with Solar Orbiter/PHI.* A. Lagg UC-153 → Perihelion SO, all orientations
12. *Searching for flare current sheet instabilities with DKIST and Solar Orbiter.* S. Mathew UC-154 → Quadrature with SO



Recurrent themes

- Specific observing configurations are: Coordination SO+PSP+DKIST
- Polar fields
- Stereoscopy
- Solar wind origin: FIP, Magnetic configuration
- Most SUCs use Cryo-NIRSP
- FOV overlaps with METIS (SPICE) & Cryo
- He abundances: what can we expect?
- Few SUCs mention PSP: interest on He abundances (SWEAP)

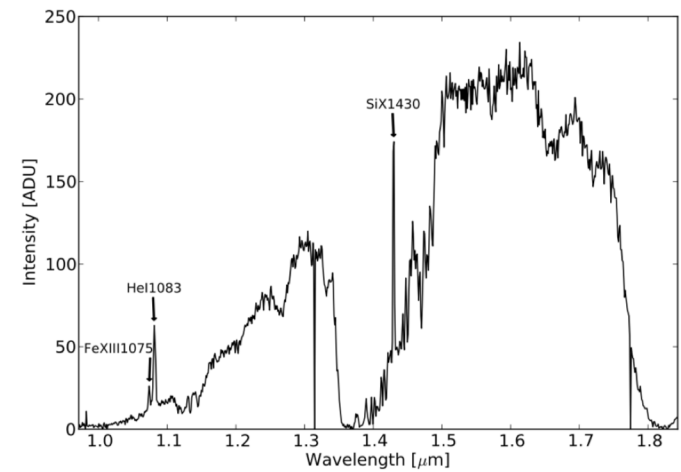
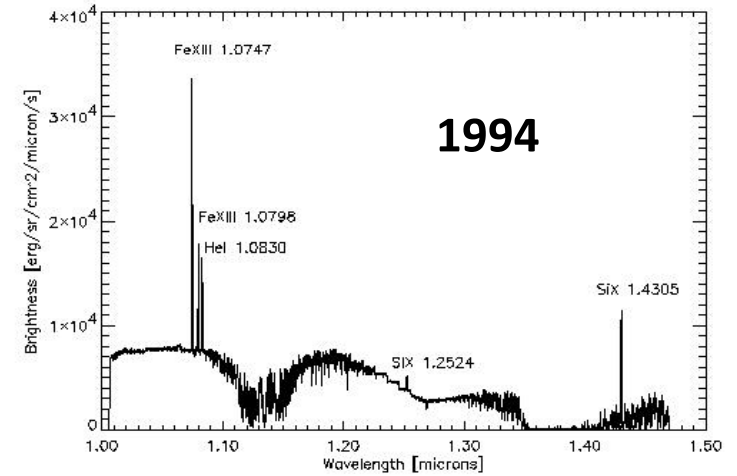


Cryo-NIRSP

Temperature sensitivity from 3000K to 2MK

Zeeman and saturated Hanle effect in forbidden lines

Wavelength (nm)	Line
1074.7, 1079.7	Fe XIII
1083	He I triplet
1430	Si X
2218	Fe IX
2326	CO
2580	Si IX
3028	Mg VIII
3935	Si IX
4651	CO

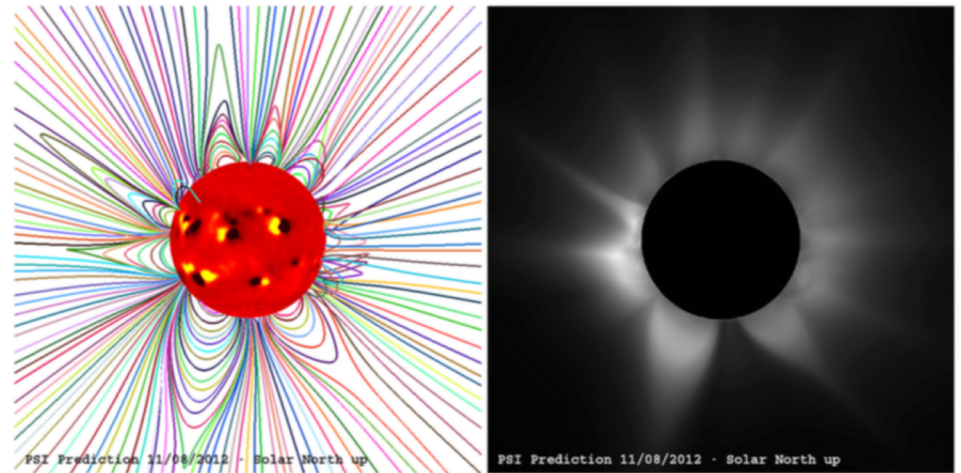
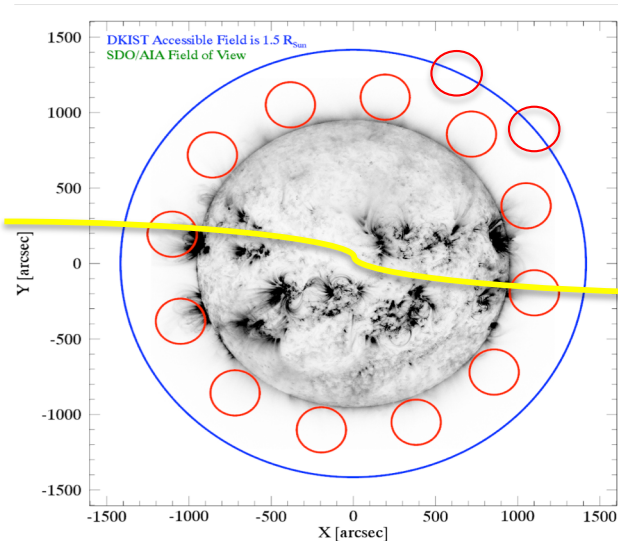


Discovery Space: MHD waves, Coronal magnetic fields, Coronal densities etc.



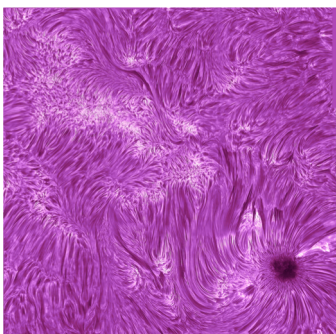
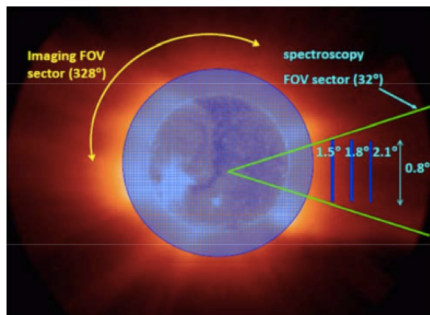
A DKIST synoptic program for encounters?

- DKIST coronal observations can occur daily
- In preparation for PSP and/or SO encounter
- Synoptic Coronal observations in anticipation (HAO/CoMP)
- Full Corona, Coronal ROI (depending on orbit)
- Emphasis on magnetic configuration (Fe XIII)
- Emphasis on Chemical composition (Fe XIII, Si IX, X, others?)

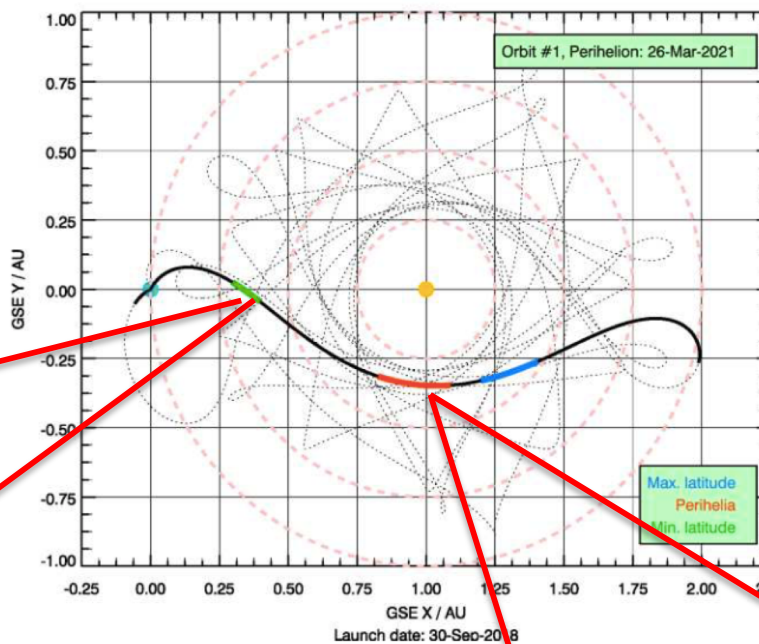


DKIST+PSP+SO Combined Science

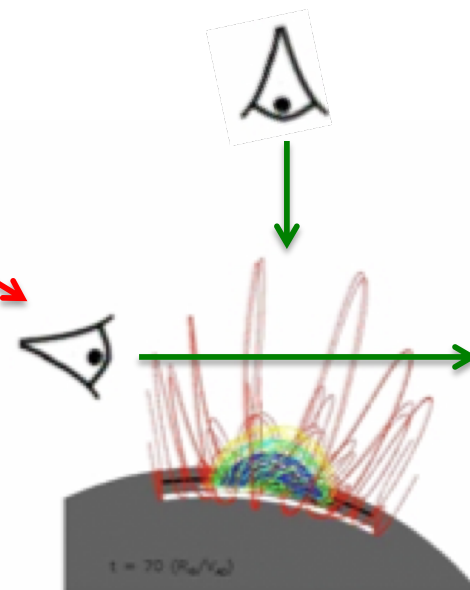
Cryo-NIRSP: 1075 nm



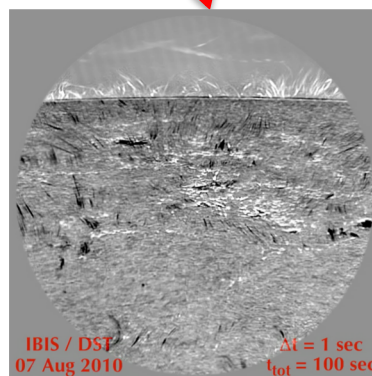
DL-NIRSP: 1083 nm
VTF: H α
ViSP: Ca II K
VBI: 789nm (FeXI)



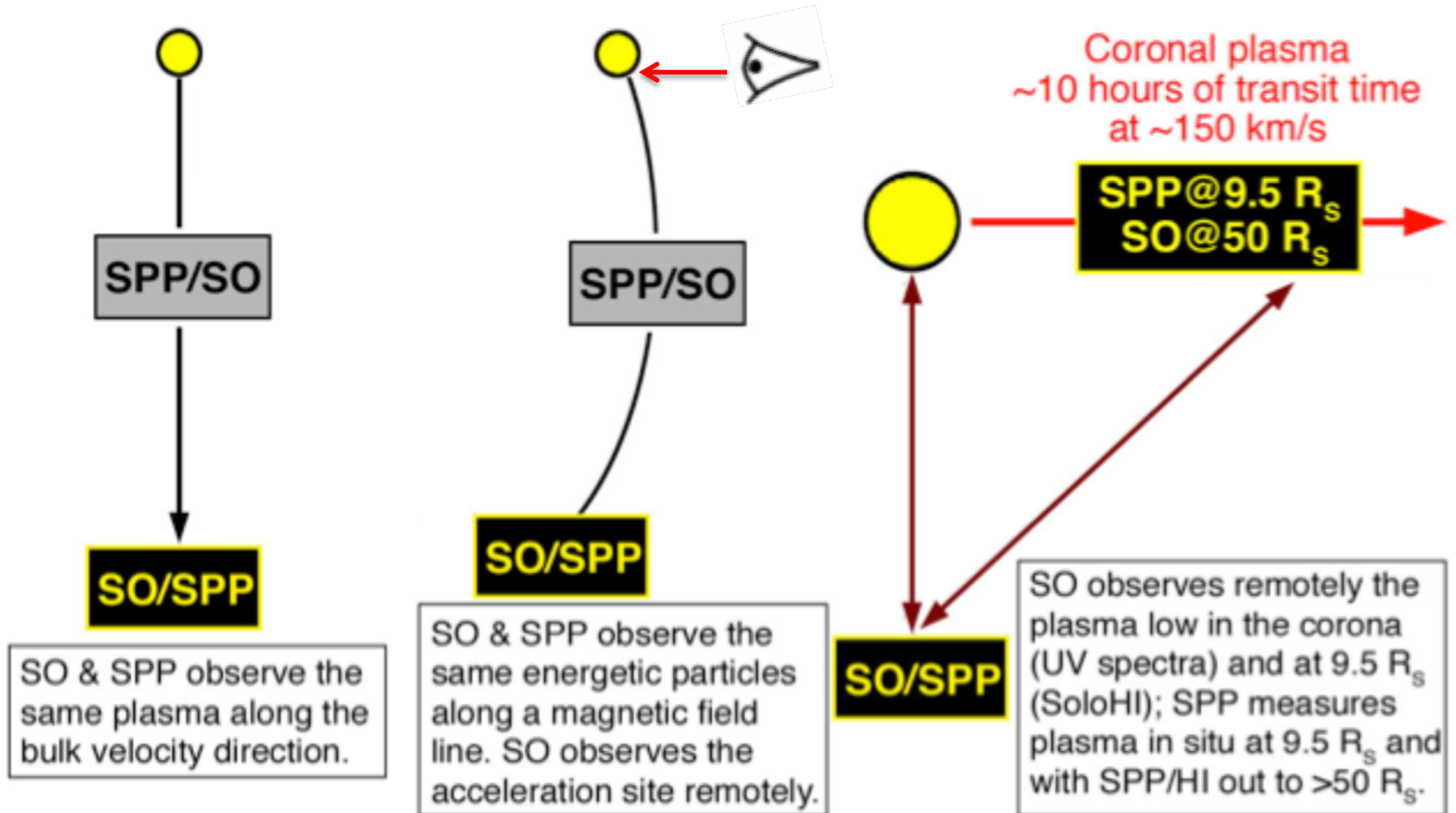
Solar Orbiter
Remote sensing
windows occur over
a few hours !!!



Cryo-NIRSP: 1075 nm

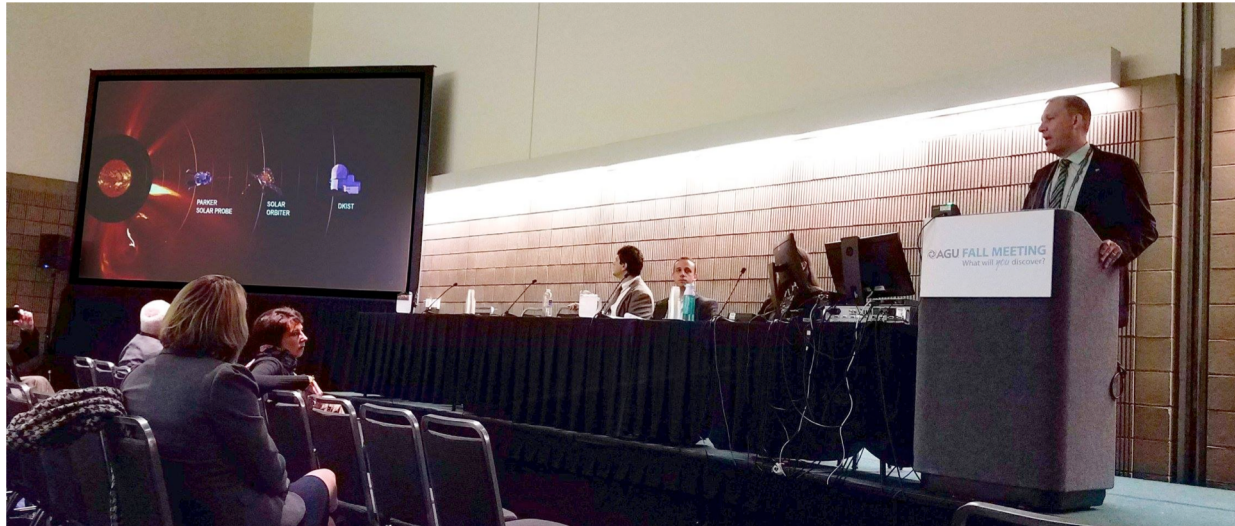


PSP+SO+DKIST



DKIST: Community engagement

Particles, fields, and photons: A multimessenger era for Solar Physics



Thanks !



<http://dkist.nso.edu/>

DKIST as a Multiwavelength Observatory

- CO vibration-rotation band 4.6 μm : Cryo
- Both disk + limb obs.
- He I 10830 \AA : DL-NIRSP, Cryo
- $\text{SNR}^{-1} 10^{-4}$, short cadence, Hanle + Zeeman effect

